

Outline of USA Module QA Activities

9 July 2002

Introduction

This document aims to clarify the locations and institute responsibilities for module QA activities in the USA barrel cluster.

Details of individual QA procedures are given in the Barrel Module FDR QA document SCT-BM-FDR-7. The most recent update is 28-May-2002.

Institute contacts for barrel module QA related matters

LBL: Alessandra Ciocio and Vitaliy Fadeyev (QA responsible) / Carl Haber
UC Santa Cruz: Felix Rosenbaum

QA of components

The QA of barrel module components is not discussed here. USA supplies of components are QA'ed by:

- Passive-stuffed hybrids by KEK (contact Nobu Unno)
- Baseboards at CERN by QMUL/Cambridge (contact Tony Carter)
- Detectors by KEK (contact Nobu Unno)
- ASICs at UCSC (contact Alex Grillo)

All components visually inspected for obvious defects before use.

QA tests during hybrid assembly

Hybrid assembly and QA of the ASIC-stuffed hybrids are the responsibilities of both LBL and UC Santa Cruz. The QA steps are as follows – assembly steps are included also for clarity:

1. Hybrids are received from KEK and unpacked
2. Visual inspection
3. Bond-pull tests
4. Assembly of ASICs onto hybrid, glue curing, wire bonding of chips to hybrid pads (but not yet to pitch adaptor)
5. Electrical characterization sequence
6. Long-term test (initially 100h at 37C on hybrid temp sensors). (For production this step will be modified to include 10 hours at 0C as now required. The cooled fixtures are being fabricated at this time.)
7. Wire-bonding of ASICs to pitch adaptor
8. Final electrical confirmation test

9. Packaging and shipping to LBL if at UC Santa Cruz.

All steps are on a 100% basis. All steps are done for pre-qualification and qualification modules, and all steps will be maintained for full production. The only change anticipated for full production is that the length, and temperature, of the long-term test may be reduced with experience across the SCT.

Hybrids failing steps 2 or 3 are returned to Japan. Hybrids failing tests 5, 6 and 8 are reworked – chip replacement being the most that can be done. To date all rework has been done at LBL but will be extended to UC Santa Cruz in the near term.

QA tests of baseboard-detector sandwich

This is done at LBL. The steps are:

1. Visual inspection of baseboard
2. Visual inspection of detectors
3. Assembly of detectors onto baseboard
4. Visual check
5. I-V measurement up to 500V
6. Full metrology
7. Cure at 30C for 8 hours.
8. I-V measurement up to 500 V
9. Full metrology.

During qualification step 8-9 showed the same results as step 5-6. For some time in early production we shall continue with both sets of steps but may abandon 5-6 if appropriate at some point.

QA tests during hybrid mounting

These are done at LBL.

1. Electrical confirmation test of hybrid
2. Visual check of hybrid
3. Assembly of hybrid onto module (gluing but not yet wire-bonding)
4. I-V measurement up to 500V as a diagnostic step.
5. Full metrology
6. Detector strip wire-bonding
7. IV test on probe station.

We should aim to reduce/eliminate step 4-5 during production if continued stability of results is observed. A hybrid failing steps 1 or 2 would be returned for re-work where possible.

QA tests on completed module

This is done at LBL.

1. I-V measurement to 500V (ASICs off)
2. Electrical confirmation test
3. Thermal cycling
4. Full metrology
5. Electrical characterization test at room temperature
6. Long-term electrical and I-V stability test (run these two concurrently, at 0C as measured by hybrid temperature sensors, in a controlled dry gas environment). Terminates with a characterization test at 0C.
7. Pack and ship to Oxford
8. Confirmation test at Oxford while still in module box, before mounting onto barrels

Modules failing the I-V tests undergo further tests at, as agreed in the February 2002 SCT week module meeting (documented by Nobu Unno). Modules failing any other tests are evaluated for re-work or storage. This rework if simple will be at LBL or else at UC Santa Cruz.

Sampling QA

Irradiation and test-beam are SCT-wide activities.

Sampling fractions are not yet defined, but will be small.